# The Gambler – Group Members

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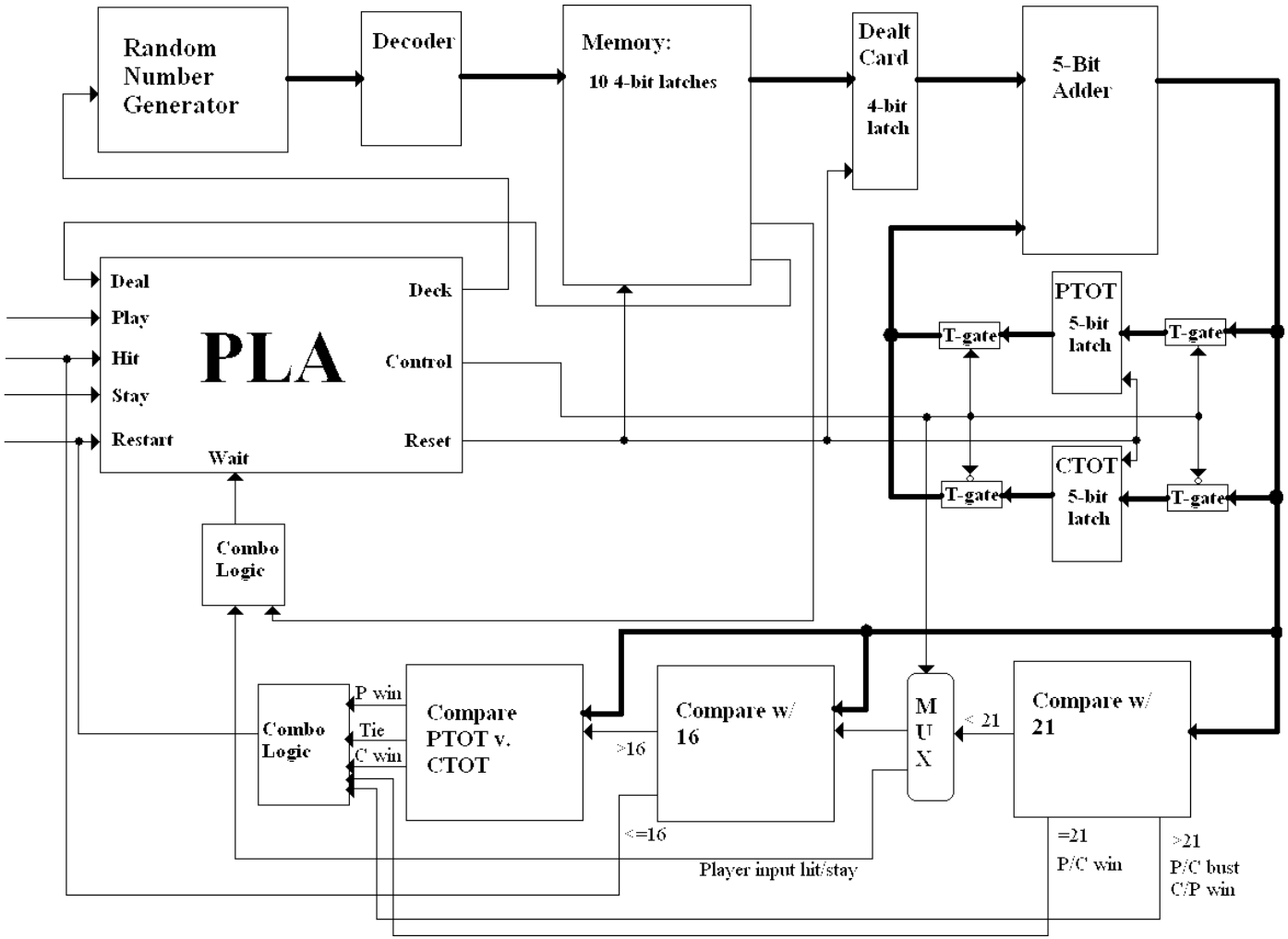
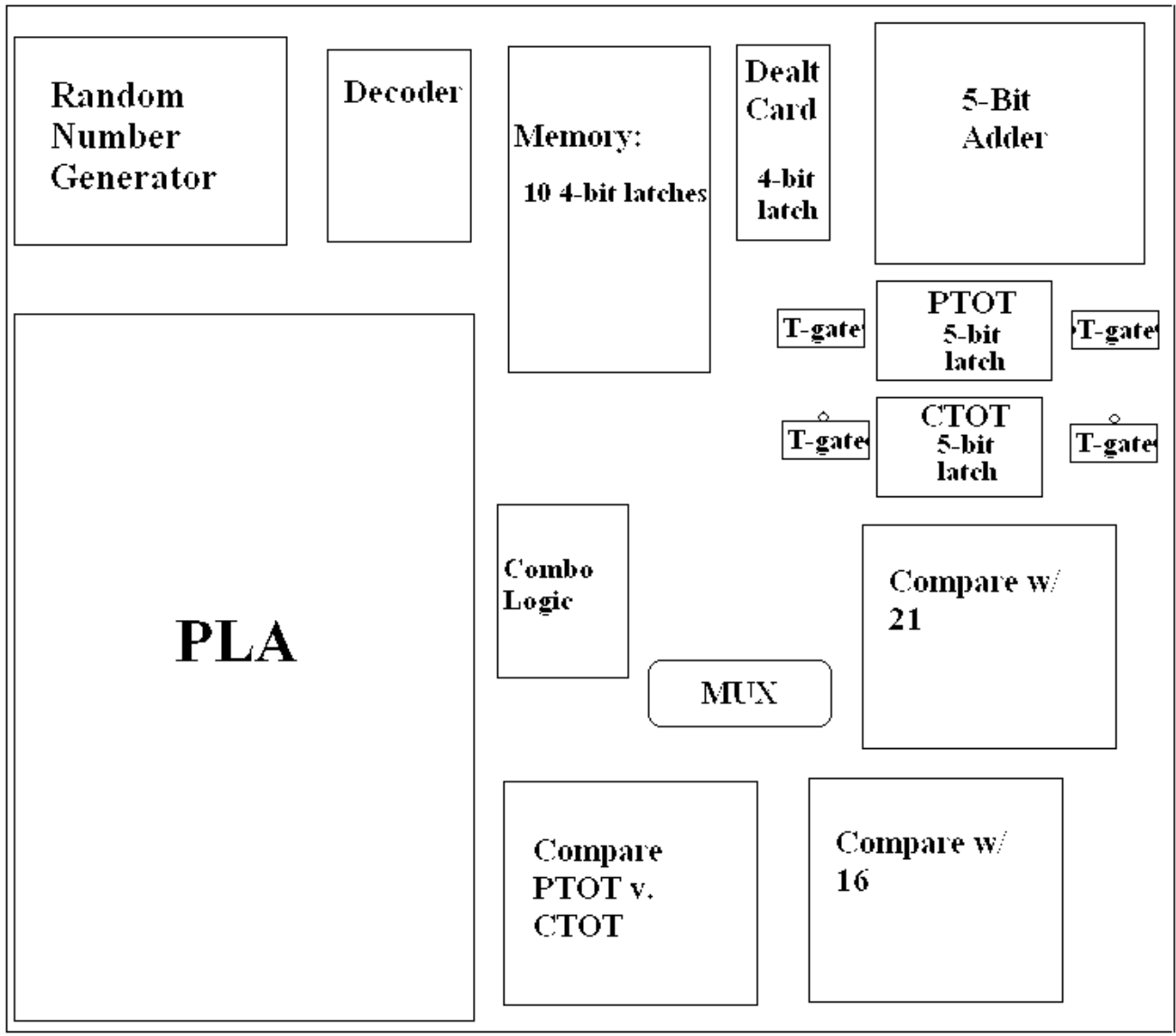
# Project Description

- Deal: Player and Computer are dealt 2 cards apiece alternately
- Player begins play, chooses to hit/stay based on his total and Computer up-card
- If Player busts, game over – Computer wins
- If Player stays, Computer begins play
- Computer must take a hit if total <= 16, else stay and compare with 21 (check for bust and Player win)
- If Computer <= 21, compare the two totals to determine winner

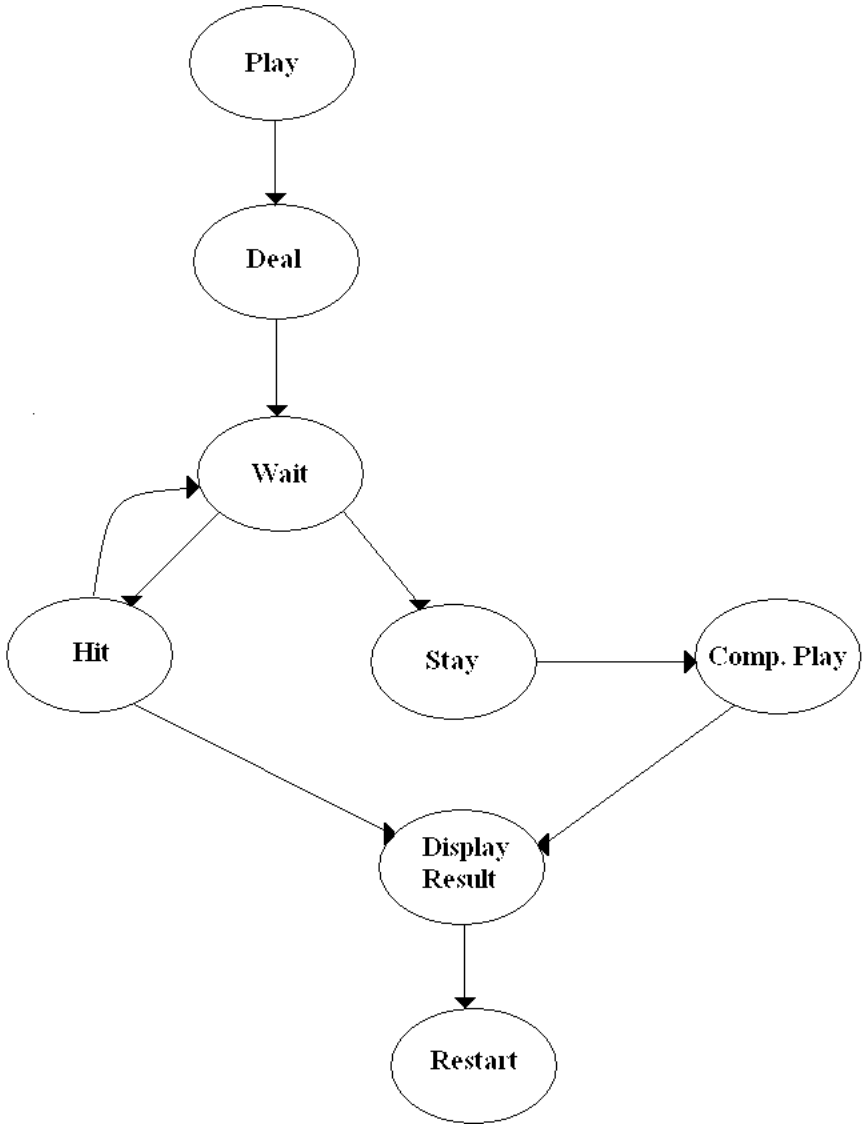
# Logic Diagram



# Floor Plan


Random Number Generator
Decoder
Memory:
10 4-bit latches
Dealt Card
4-bit latch
5-Bit Adder
T-gate
PTOT
5-bit latch
T-gate
T-gate
CTOT
5-bit latch
T-gate
PLA
Combo Logic
MUX
Compare w/ 21
Compare PTOT v. CTOT
Compare w/ 16

# State Diagram



# Random Number Generator

## Linear Congruential Method

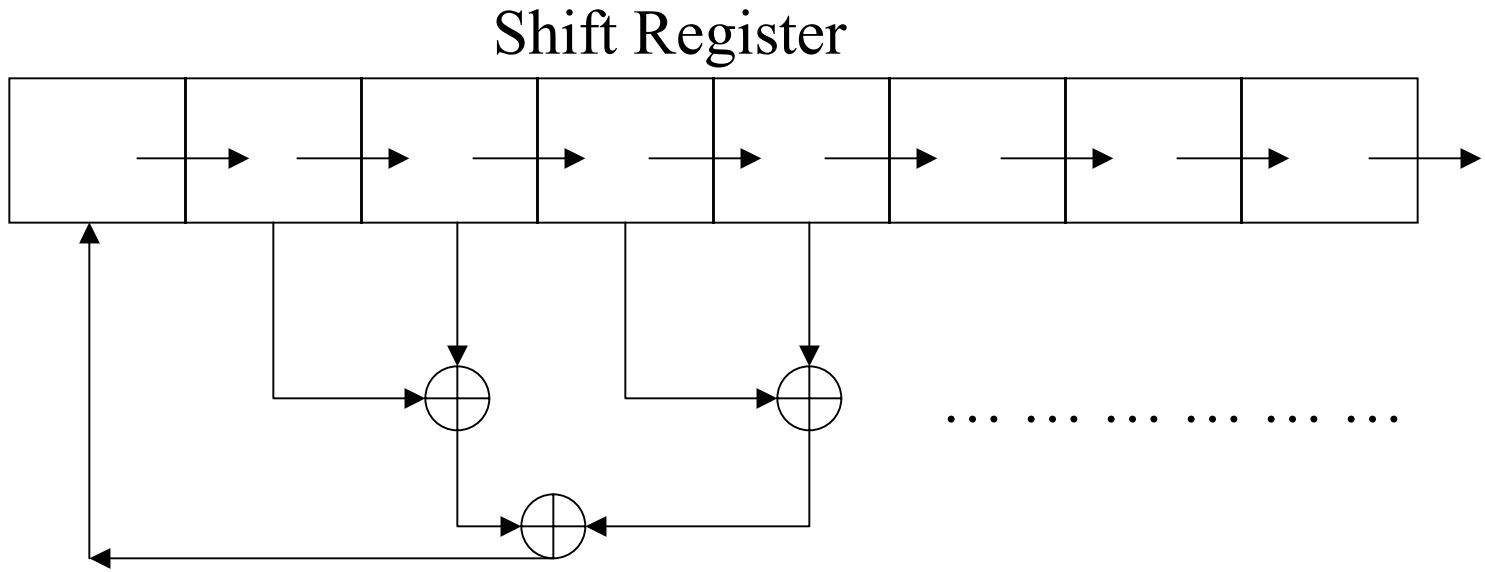
$$Z_{i+1} = \alpha\ Z_i \bmod M$$

where $M$ is a prime number, and $0 < \alpha < M - 1$

## Properties of LCM

- Period Limitations 1,26,34,12,1…
  - Values Can Never Immediately Repeat
- Uniformity
  - Evenly Distributed Probabilities
- Seed
  - Only one sequence for each seed

# Pseudo-Random Number Generator



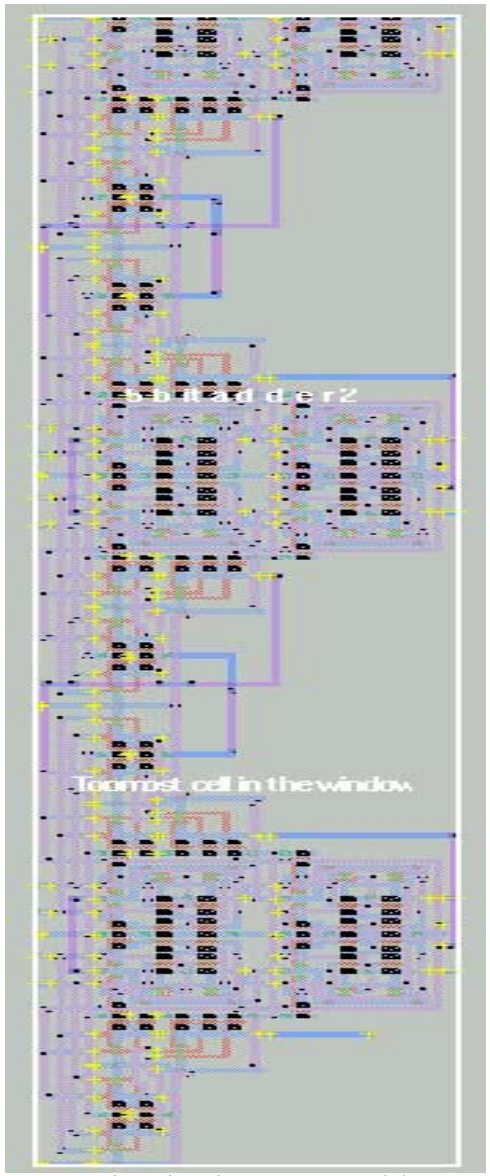

## Disadvantages

- Shorter Period
- Numerous Generated Numbers Unused
- Less Random Sequences Require Wider Range of Seeds

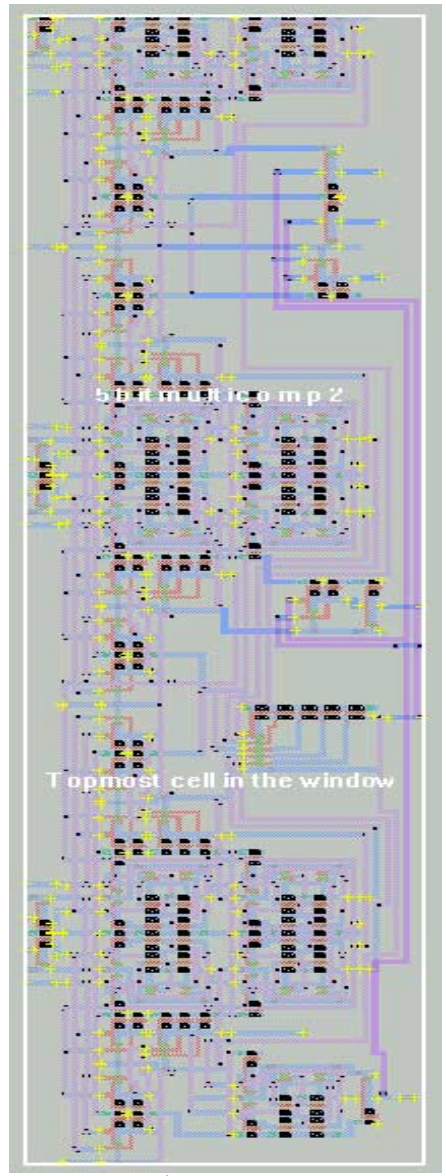
## Advantages

- Wider Range of Seeds Possible
- Faster than a Modulo Generator

# Cell Hierarchy

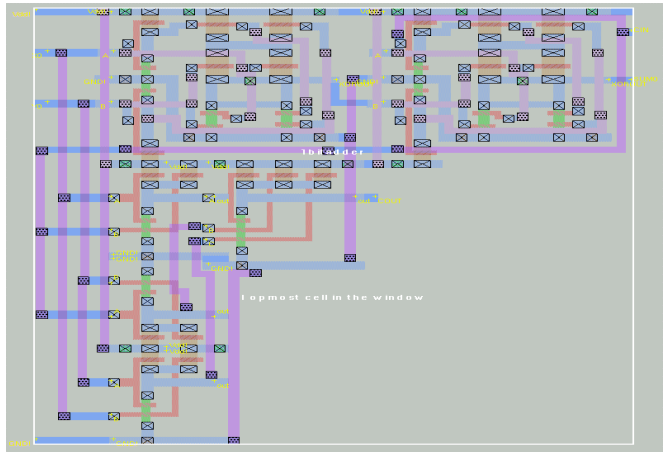


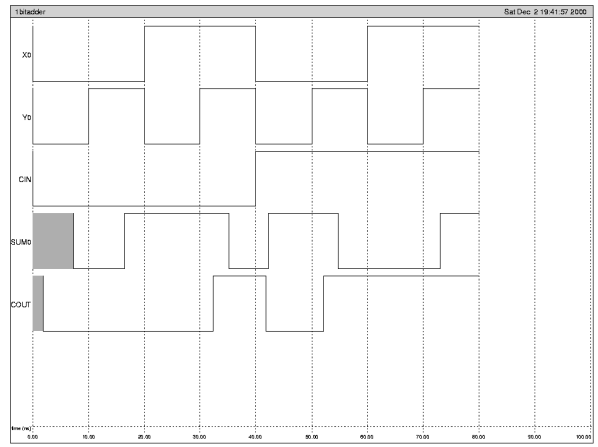

5 Bit Ripple Carry Adder




5 Bit Comparator

# 1 Bit Adder




# 1 Bit Latch